



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/760,659	01/20/2004	Simon C. Steely JR.	200313629-1	9866

22879 7590 12/10/2009
HEWLETT-PACKARD COMPANY
Intellectual Property Administration
3404 E. Harmony Road
Mail Stop 35
FORT COLLINS, CO 80528

EXAMINER

CHERY, MARDOCHEE

ART UNIT	PAPER NUMBER
----------	--------------

2186

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

12/10/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

JERRY.SHORMA@HP.COM
ipa.mail@hp.com
laura.m.clark@hp.com

Office Action Summary	Application No. 10/760,659	Applicant(s) STEELY ET AL.	
	Examiner MARDOCHEE CHERY	Art Unit 2186	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,8-12 and 18-32 is/are rejected.
- 7) ☒ Claim(s) 2-7,13-17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/13/09</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after appeal to the Board of Patent Appeals and Interferences, but prior to a decision on the appeal. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on August 13, 2009 has been entered.

2. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 2186

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Response to Amendment

3. No amendment has been filed. On July 20, 2007, Appellants filed a Notice of Appeal. However, on August 13, 2009, Appellants filed a Request for Continued Examination (RCE) under 37 C.F.R. 1.114. The RCE is treated as a request to withdraw the appeal.

Response to Arguments

4. No arguments/remarks have been filed. Appellants' submission is in the form of Information Disclosure statements (IDSs) filed on August 13, 2009. Thus, the claims stand rejected and will be treated as in the Office action dated April 20, 2007.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 8-10, 12, 18-19, and 24-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arimilli (2002/0129211) in view of Chen (6,931,496).

As per claim 1, Arimilli discloses a system comprising: a first node including data having an associated state, the associated state of the data at the first node being a modified state [page 7, par. 0060, claim text 1]; and a second node operative to provide a non-migratory source broadcast request for the data, the second node being operative to receive the data from the first node and assign a shared state to an associated state of the data at the second node [par. 0029, page 7, par. 0060, 0062, claim text 1].

However, Arimilli does not explicitly teach the first node being operative in response to the non-migratory source broadcast request to provide the data to the second node and to transition the associated state of the data at the first node from the modified state to an owner state without updating memory as required by the claim.

Chen discloses the first node being operative in response to the non-migratory source broadcast request to provide the data to the second node and to transition the associated state of the data at the first node from the modified state to an owner state without updating memory [col.5, ll 5-10, ll 36-42, ll 60 to col. 6, ll 6] to provide a data maintenance method in a distributed shared memory system to efficiently solve the access deadlock problem (col. 3, ll 10-12).

Thus, it would have obvious to one of ordinary skill in the art at the time of invention by Applicant, to modify the system of Arimilli to include transitioning the

Art Unit: 2186

associated state of the data at the first node from the modified state to an owner state without updating memory because this would have provided a data maintenance method in a distributed shared memory system to efficiently solve the access deadlock problem (col. 3, ll 10-12) as taught by Chen.

As per claim 8, Chen discloses the first node is operative in response to the non-migratory source broadcast request to provide a shared data response to the second node [col. 6, ll 1-6].

As per claim 9, Arimilli discloses further migration of the data from the second node is precluded when the associated state of the data at the second node is the shared state [Abstract].

As per claim 10, Chen discloses at least one other node that provides a non-data response to the second node in response to the non-migratory source broadcast request from the second node, the non-data response indicating that the at least one other node does not have a valid copy of the data requested by the second node [col. 7, ll 55-61].

As per claim 12, the rationale in the rejection of claim 1 is herein incorporated. Arimilli further discloses second processor nodes having cache lines with associated

Art Unit: 2186

states, and that the second processor node is operative to provide a non-migratory read request for data [Fig. 1; par. 0029].

As per claim 18, the rationale in the rejection of claim 9 is herein incorporated.

As per claim 19, the rationale in the rejection of claim 10 is herein incorporated.

As per claim 24, the rationale in the rejection of claim 1 is herein incorporated.

As per claim 25, the rationale in the rejection of claim 1 is herein incorporated. Arimilli further discloses means for providing the data from the second node to the first node in response to a migratory read request [Figs. 3-4; *master receives store operation from processor, owned state*; par. 0029]; and means for transitioning the modified state associated with the data at the second node to an invalid state [Figs. 3-4, *master performs store, issues kill transactions to invalidate copies held by other agents*; pars. 0006-0008].

As per claim 26, Chen discloses means for selecting one of the XREADM request and XREADN request to broadcast from the first node [Figs. 4 and 5].

As per claim 27, Chen discloses means for predictively selecting one of the XREADM request and XREADN request to broadcast from the first node [Figs. 4 and 5].

As per claim 28, the rationale in the rejection of claim 1 is herein incorporated.

As per claim 29, the rationale in the rejection of claim 1 is herein incorporated.
Arimilli further discloses broadcasting from a first node a migratory read request for data responsive to the migratory request for the data [Figs. 3-4; par. 0029]

As per claim 30, the rationale in the rejection of claim 26 is herein incorporated.

As per claim 31, the rationale in the rejection of claim 27 is herein incorporated.

As per claim 32, the rationale in the rejection of claim 1 is herein incorporated.
Arimilli further discloses a cache coherency that permits migration of data to a cache associated with a source processor from a cache associated with a target processor when a migratory request is issued [Figs. 3-4; *master receives store operation from processor, owned state; master performs store, issues kill transactions to invalidate copies held by other agents; par. 0029*].

7. Claims 11 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arimilli (2002/0129211) in view of Chen (6,931,496) and further in view of Cypher (6,484,240).

As per claim 11, Arimilli discloses the first node defines a first processor and the second node defines a second processor [Fig. 1], the first and second processors each having an associated cache that comprises a plurality of cache lines [Fig. 1], the first and second processors being capable of communicating with each other and with a system memory via an interconnect [Fig. 1, System Bus 12].

Chen further discloses the system further comprising a first cache controller associated with the first processor and a second cache controller associated with the second processor [Fig. 1], the first cache controller being operative to manage data requests and responses for the associated cache of the first processor [Fig. 1], the first cache controller effecting state transitions associated with the data in the associated cache of the first processor based on the data requests and responses for the associated cache of the first processor [Fig. 1], the second cache controller being operative to manage data requests and responses for the associated cache of the second processor [Fig. 1], the second cache controller effecting state transitions associated with the data in the associated cache of the second processor based on the data requests and responses for the associated cache of the second processor [Figs. 2-5].

However, Arimilli and Chen do not explicitly teach each cache line having a respective tag address that identifies associated data and each cache line having state

Art Unit: 2186

information that indicates a state of the associated data for the respective cache line as required by the claim.

Cypher discloses each cache line having a respective tag address that identifies associated data and each cache line having state information that indicates a state of the associated data for the respective cache line [col. 1, ll 20-25] to specify the access rights and ownership responsibilities for a corresponding processor (col. 1, ll 23-25).

Thus, it would have been obvious to one of ordinary skill in the art at the time of invention by Applicant to modify the system of Arimilli and Chen to include each cache line having a respective tag address that identifies associated data and each cache line having state information that indicates a state of the associated data for the respective cache line since this would have enabled specifying the access rights and ownership responsibilities for a corresponding processor (col. 1, ll 23-25) as taught by Cypher.

As per claim 20, the rationale in the rejection of claim 11 is herein incorporated.

As per claim 21, the rationale in the rejection of claims 1 and 11 is herein incorporated. Arimilli further discloses a source processor having an associated source processor cache, the source processor being operative to issues a selected one of a non-migratory source broadcast (XREADN) request for data and a migratory source broadcast (XREADM) request for the data [Figs. 3-4; par. 0029].

As per claim 22, Chen discloses the source processor further comprises an associated source processor cache having a source processor cache line for storing the data, the source processor cache line having an associated state, the source processor storing the data in the source processor cache line and assigning a shared state to the associated state of the source processor cache line in response to receiving the S-DATA response from the target processor [coll6, ll 58 to col. 7, ll 17; col. 7, ll 49 to col. 8, ll 3].

As per claim 23, Chen discloses the source processor further comprises an associated source processor cache having a source processor cache line for storing the data, the source processor cache line having an associated state, the source processor storing the data in the source processor cache line and assigning a dirty state to the associated state of the source processor cache line in response to receiving the D-DATA response from the target processor [col. 7, ll 49-61; col. 8, ll 52-67].

Allowable Subject Matter

8. Claims 2-7, 13-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the

Art Unit: 2186

grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **MARDOCHEE CHERY** whose telephone number is (571)272-4246. The examiner can normally be reached on 8:30A-5:00P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim can be reached on (571)272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2186

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mardochee Chery/
Examiner, Art Unit 2188

December 5, 2009